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(56) Documents Cited

JP 070227847 A US 6000323 A
US 5355789 A US 3736863 A
US 3575103 A

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(54) Abstract Title
Waste compaction

(57) A waste compaction unit comprises a body for receiving refuse 5, closure means 2 for sealing the unit and a compressor 7 to feed air into the sealed unit to compress the refuse 5. A predetermined compaction pressure may be maintained for a predetermined time such as four hours. As shown, the air is fed into a plunger 13 which expands to compress the refuse, the plunger terminating in a plate 14 and replaceable pad 15. Springs 16 may serve to retract the plunger 13 when the compressor 7 is deactivated, and the collapsed plunger may be received in the lid 2. Alternatively, Figure 1, there may be no plunger and the air may be fed direct into the interior of the body to directly contact the refuse 5, with air vent pipe 10 including a solenoid-activated valve (12) in this embodiment.

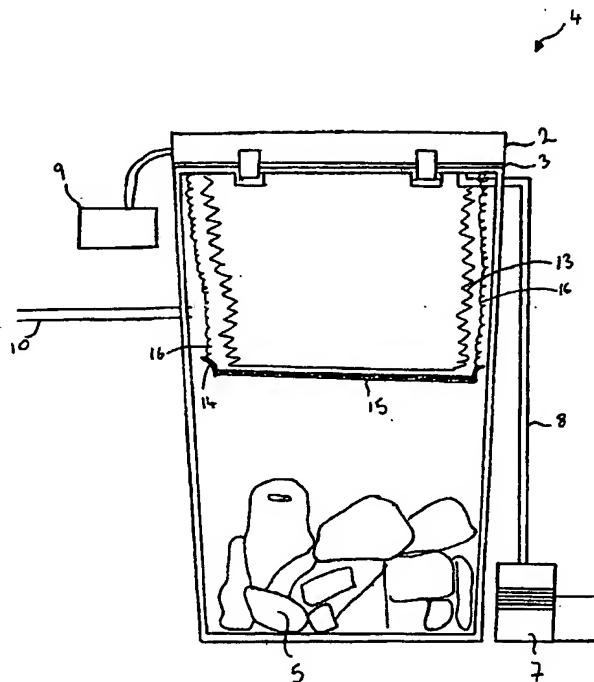


Figure 2

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

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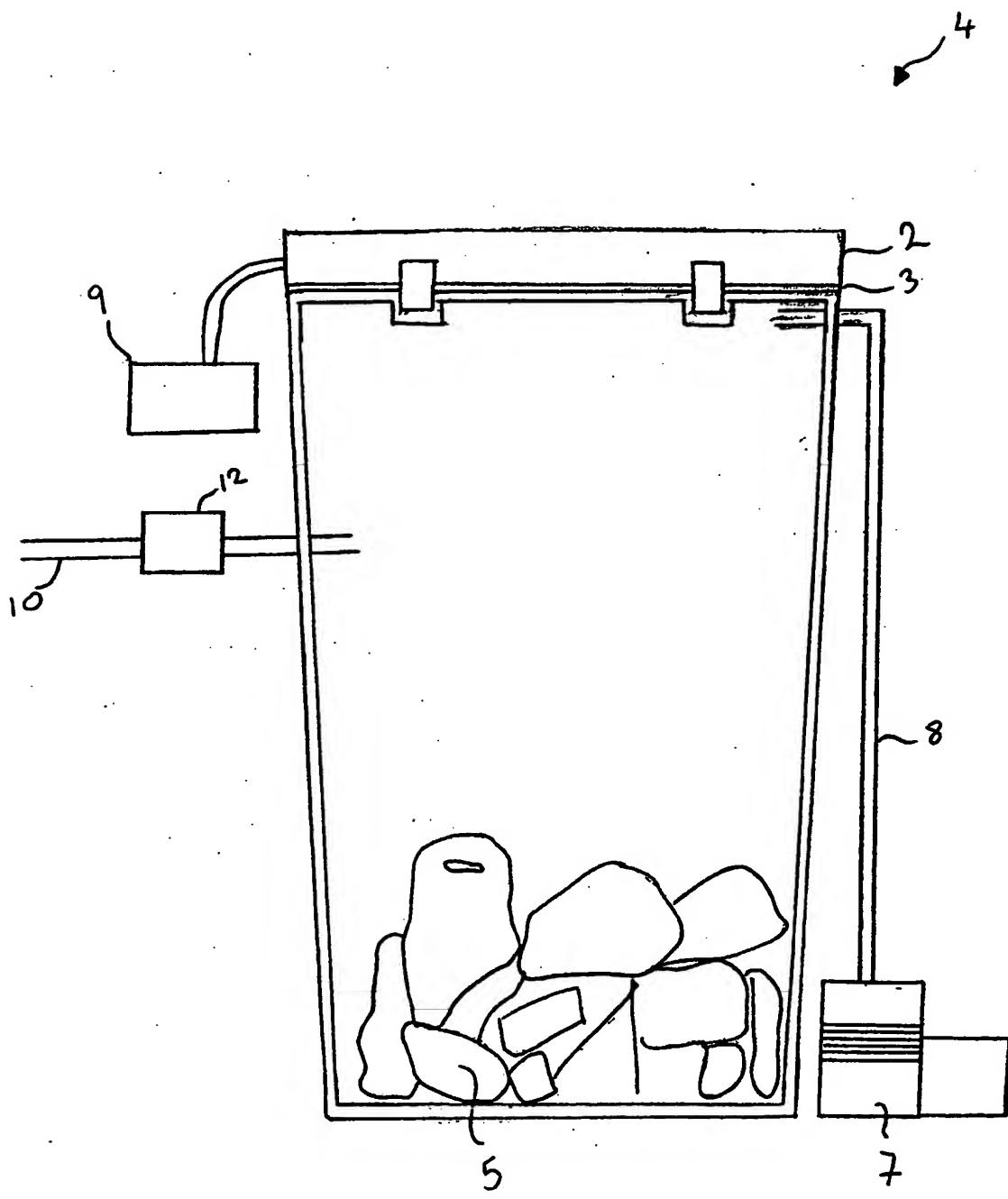


Figure 1

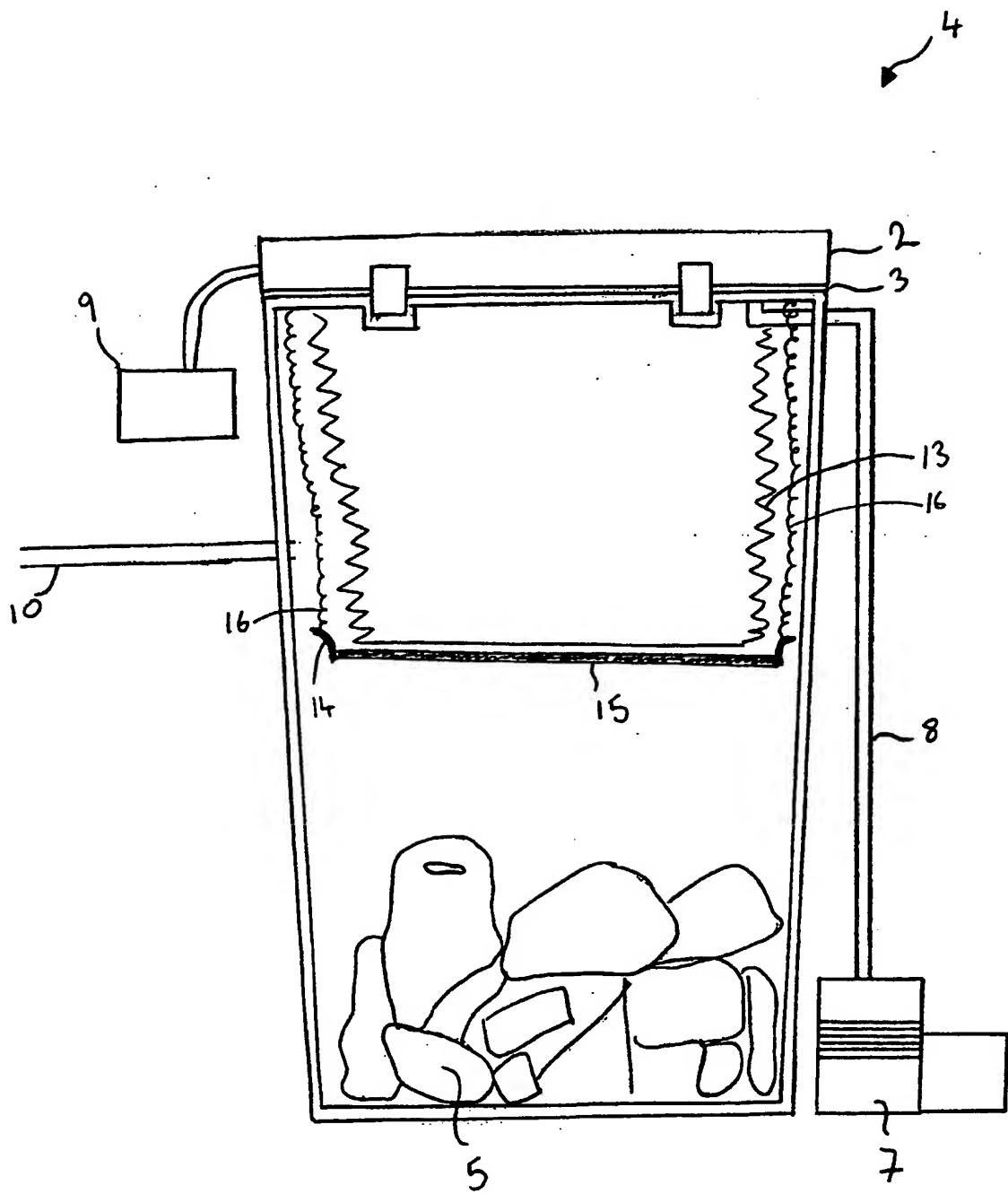


Figure 2

WASTE COMPACTION UNIT AND METHOD

This invention relates to a unit for and a method of compacting waste prior to disposal. The unit and method are particularly useful but not limited to use in a domestic environment, for example in the home or in hotels and catering establishments.

Disposal of domestic waste is becoming more difficult in today's society, as more and more waste is produced, and the capacity of existing landfill sites is rapidly exhausted. Present methods of disposal of domestic waste are extremely inefficient due to the fact that the waste generally takes up so much volume in comparison to its weight. In general domestic waste is transported by waste disposal vehicles which carry between 10% and 20% of their potential capacity by weight, the total capacity being limited by the volume of the waste material. Some waste compaction is carried out by these waste disposal vehicles. In general the waste is subjected to compression during the journey, although due to the fact that most materials exhibit 'shape memory', once the waste material is emptied from the vehicle some expansion takes place and the waste material returns towards its original shape and therefore volume. Therefore landfill sites are filled up more quickly by this large volume waste than is strictly necessary.

Domestic waste processing systems are known which crush or pulverise waste prior to disposal. However, such systems are generally large and cumbersome and use a large amount of power to achieve the desired result. Use of excessive energy is contrary to the objective of providing a more

environmentally friendly waste disposal system.

It is an objective of the present invention to alleviate some of these aforementioned problems

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According to the present invention there is provided a waste compaction unit comprising a body having an opening for receiving waste; closure means attachable to the body for sealing the unit; and a compressor arranged to operate to feed air into the sealed unit to compress waste contained therein.

10 Use of compressed air to compact the waste is advantageous because the amount of power needed to achieve the desired 15 compaction is much less than in mechanical waste compaction systems.

It is an advantage for venting foul air from the unit, and for reducing pressure when the unit is to be opened if the 20 unit further comprises an outlet having a valve which is operable to open the pipe when the compressor is deactivated.

In an improved version of the invention the unit also 25 comprises a plunger, which is expanded by air from the compressor in order to compress waste contained within the unit. Preferably, the plunger further comprises a plate mounted on a compaction surface which contact waste when the plunger is expanded. Preferably, the plunger further comprises retaining springs which retract the plunger when 30 the compressor is not operating.

In the improved version it is an advantage if there is an

outlet provided for venting the interior of the unit to outside the unit.

To improve safety and to prevent a user attempting to open 5 the unit while it is pressurised, it is an advantage if there is provided a lock for retaining the closure means until the unit internal pressure is reduced sufficiently to safely remove the closure member.

10 According to a second aspect of the invention there is provided a method of domestic waste compaction comprising the steps of pumping compressed air into a sealed unit; maintaining a predetermined pressure for a predetermined time. Ideally the predetermined time is at least four hours.

15 In a preferred embodiment the pumping step comprises pumping air into an expandable plunger.

Embodiments of the invention will now be described, by way of 20 example only, with reference to the accompanying drawings, in which

Figure 1 illustrates a first embodiment of the invention; and
25 Figure 2 illustrates a second embodiment of the invention.

Referring now to Figure 1, a household compression bin 4 comprises a body compartment 1 and a lid 2. In this 30 embodiment of the invention the bin measures approximately 700mm x 400mm. Other sizes and shape can equally well be used, for example for use in a 'wheely bin' the bin capacity

would be greater. There is a pressure seal 3 between the lid 2 and the body 1. Waste material 5 is stored in the body compartment 1 in a strong plastic liner 6 which may be manufactured for example from a co-extruded plastic.

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A compressor 7 is connected to a standard 240V domestic power supply. A pressure pipe is connected via an aperture at the top of the body compartment 1. A controller 9 is used to control the compressor 7 and to allow opening and closing of 10 the lid 2. An air pipe 10 is connected via a second aperture in the body compartment 1 to an air vent, which allows foul air to be released from the interior of the body compartment through a solenoid activated valve 12.

15 When the compressor 7 is activated the lid is sealed so that it may not be opened whilst the content of the bin are under pressure. The compressor operates at full power until a predetermined pressure has been achieved and then maintains this pressure. In this embodiment of the invention the 20 predetermined pressure is approximately 20 tonnes/m² (200 000 Pascals, approximately double atmospheric pressure), although the invention is not restricted to use of a compressor achieving this particular pressure. The resulting air pressure serves to compress the waste material. This pressure 25 is maintained for a period of time such that the waste material is compressed for long enough not to exhibit shape memory, so that it does not return towards its original volume once the pressure is released. Ideally, in a domestic environment the compressor is operated for a period of time 30 during the night, which is particularly advantageous if the power supply costs are less at that time. The compressor may operate for a predetermined amount of time by use of a timer

in the controller 9. Most materials only have about four hours memory, so compression in excess of four hours is desirable, and compression for more than six hours is preferable.

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The bin 4 is constructed from a 10mm thick metal, for example steel, in order to withstand the air pressure produced during compression of the waste.

- 10 The controller is used to deactivate the compressor and to allow the lid 2 to open. The valve 12 is operated by the solenoid and opened in order to vent compressed air, preferably to outdoors. After a predetermined time (or when the pressure has reduced sufficiently) the lid seal is
15 released and the lid may be opened to introduced further waste to the body compartment 1.

Figure 2 illustrates a second embodiment of the invention which further comprises a plunger 13. The plunger 13 is
20 fabricated from a strong rubber or plastic material, although other suitable materials could equally well be used. The plunger 13 is stored in the lid 2 when compressed so that when the lid 2 is lifted the plunger 13 does not obstruct the opening to the body compartment 1.

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The plunger 13 is connected via the pressure pipe 8 to the compressor 7. In this embodiment the plunger 13 is operated using compressed air. The plunger 13 may have a plate 14 in order to aid crushing waste. The plate 14 serves to protect the plunger 13 when the plunger 13 is retracted into the lid 2. Furthermore the plunger 13 may have a removable pad 15 which can be changed when required for hygiene purposes. In

one embodiment of the invention the plunger 13 is retracted by means of springs 16 when the compressor 7 is deactivated. In this embodiment the plate 14 is rectangular (although it could equally well be circular or some other suitable shape) 5 and the spring 16 are attached to each corner of the plate 16 to ensure even retraction of the plunger 13. In another embodiment the compressor 7 is a two way compressor so that the pressure is released by reversing the compressor and withdrawing the plunger 13.

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In the embodiment of the invention shown in Figure 2, there is no solenoid activated valve, and the air pipe 10 serves to allow for the expulsion of air when the plunger 13 is expanded, and for the ingress of air when the plunger 13 is 15 retracted.

It is intended that the foregoing detailed description be regarded as illustrative rather than limiting and that it be understood that it is the following claims, including any 20 equivalents, which are intended to define the scope of the invention.

CLAIMS

1. A waste compaction unit comprising
a body having an opening for receiving waste;
closure means attachable to the body for sealing
the unit; and
a compressor arranged to operate to feed air into
the sealed unit to compress waste contained therein.
- 10 2. A waste compaction unit according to claim 1, further
comprising an outlet having a valve which is operable to open
the pipe when the compressor is operated.
- 15 3. A waste compaction unit according to claim 1, further
comprising a plunger, which is expanded by the compressor in
order to compress waste contained therein.
- 20 4. A waste compaction unit according to claim 3, in which
the plunger further comprises a plate mounted on a compaction
surface which contact waste when the plunger is expanded.
- 25 5. A waste compaction unit according to claim 3 or claim 4,
further comprising an outlet venting the interior of the unit
to outside the unit.
- 30 6. A waste compaction unit according to any one of claims 3
to 5, in which the plunger further comprises retaining
springs which retract the plunger when the compressor is not
operating.
7. A waste compaction unit according to any one of the
preceding claims, further comprising a lock for retaining the

closure means until the unit internal pressure is reduced sufficiently to safely remove the closure member.

8. A waste compaction unit according to any one of the
5 preceding claims in which the compressor is arranged to operate for a minimum time of four hours.

9. A method of domestic waste compaction comprising the steps of

10 pumping compressed air into a sealed unit;
maintaining a predetermined pressure for a predetermined time.

10. A method according to claim 8 in which the pumping step
15 comprises pumping air into an expandable plunger.

11. A method according to claim 9 or claim 10 in which the predetermined time is four hours.

20 12. A waste compaction unit substantially as herein described, with reference to the accompanying drawings.

13. A method of waste compaction, substantially as herein described with reference to the accompanying drawings.

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Claims searched: 1-13

Examiner: Stephen Smith
Date of search: 22 May 2002

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T): A4A(AE)

Int Cl (Ed. 7): B65F 1/14

Other: ONLINE: EPODOC, PAJ, WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	JP 7227847 (MATSUSHITA) abstract, Figure 1	1, 3, 4, 9, 10
X	US 6000323 (SCHLEGEL) lines 26-30 of column 6	1, 3, 9, 10
X	US 5355789 (SUZUKI) line 21 of column 4 to line 12 of column 5	1, 3-5, 7, 9, 10
X	US 3736863 (BRUCKER) lines 5-45 of column 2; lines 51-61 of column 3	1-7, 9, 10
X	US 3575103 (CHARLES) lines 40-54 of column 2	1, 3, 4, 9, 10

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